



ESSAAC Technology Subcommittee Report

**Fawwaz T. Ulaby, Chair
February 18, 2004**



ESSAAC Technology Subcommittee (TSC)

- ✓ **Nov. 4, 2003 Meeting: Tour of several laser development and risk reduction labs at NASA/GSFC**
- ✓ **Nov. 5: Formal meeting at Holiday Inn, Washington DC**
- ✓ **TSC Members**
 - Fawwaz T. Ulaby**, U of Michigan (chair)
 - William Brown**, MIT
 - Daniel Cooke**, Texas Tech
 - Alok Das**, Air Force Research Lab
 - David Ebert**, Purdue
 - Sara Graves**, U of Ala.-Huntsville
 - Michael Hardesty**, NOAA
 - James Hendler**, U of Maryland
 - Kristine Larson**, U of Colorado
 - Robert Weiss**, Physical Sciences, Inc.



TSC Observations and Recommendations

GENERAL

- 1. As with many of NASA's technology programs, there is a struggle to balance the following sets of considerations:**
 - Maintaining balance between supporting core competencies within the agency versus investing in out-of-house technology developments in industry and academia.
 - Maintaining balance in technology portfolios versus integrating technologies developed by other agencies.
 - Maintaining balance between industry state of the art (SOA) and state of practice (SOP) versus university and other government laboratories SOA and SOP.
 - TSC is not aware of the process by which NASA manages to balance the above considerations or, if such a process exists. Hence, TSC requests a briefing from ESTO on this topic at the next TSC meeting.
- 2. NASA's technology program can greatly benefit from similar technology investments made by DOD and industry. To that end, NASA needs to form closer connections with relevant federal laboratories and with industrial labs funded by DOD.**



TSC Observations and Recommendations

LASER PROGRAM

- 1. ESE's emphasis on active sensors, including lidars, as a major tool in the next generation of remote sensing instruments is well placed and should be accelerated. However, meeting all of the science needs in laser altimetry, wind measurements, CO₂, and ozone mapping will require a technology development program funded at substantially higher levels than current NASA laser development activities. ESE should either narrow down the scope of the applications it wishes to support or increase the funding for technology development.**
- 2. NASA should take a systems view when setting requirements for lidar by including optics, detectors and laser transmitters in the overall analysis. A similar trade-off should be considered between the use of expensive, data-intensive pulse digitization versus microlaser high PRF technology.**



TSC Observations and Recommendations

LASER PROGRAM (cont.)

3. Review of The Laser Risk Reduction Program (LRRP) has raised a number of questions, including:
 - Despite the fact that hundreds of millions of dollars of laser-based sensors are at risk (CALIPSO, ICESat, etc.) LRRP does not appear to have made significant progress towards reducing the risk of laser failure, does not have clearly defined objectives and deliverables, and has little awareness of similar DOD programs and investments.
 - Although the LRRP program has a stated budget of \$9 million, judging by the reported results, it appears that only a small fraction of that amount has been spent on risk reduction studies.
 - Is testing being done in realistic environments and configurations?
 - GSFC is building a 1-micron laser. It is not clear how it will be significantly different from other currently available 1-micron lasers.

It is recommended that NASA conduct a thorough evaluation of the program based on progress realized thus far toward improving laser reliability. NASA should consider focusing the effort on diagnostics and realistic validation of laser modules, or returning the funds to the IIP and establishing LRRP as a part of IIP.

4. Greater attention should be paid to the data aspects of the various laser technologies to insure its optimal use by the science community.



Future Plans

- ✓ **March 22, 2004: Visit JPL to learn about microwave activities and large deployable apertures**
- ✓ **April 13 & 14: TSC meeting in Washington DC**
 - **Response from NASA on laser-related questions**
 - **Review of microwave technology**
- ✓ **Fall 2004: Focus on communication systems and data processing**